

Claims

- [c1] A method for etching a silicon on insulator (SOI) substrate, the method comprising:
opening a hardmask layer formed on an SOI layer of the SOI substrate; and
etching through said SOI layer, a buried insulator layer underneath said SOI layer, and a bulk silicon layer beneath said buried insulator layer using a single etch step.
- [c2] The method of claim 1, wherein said etching is implemented with an HBR, NF_3 and O_2 etch chemistry.
- [c3] The method of claim 2, wherein said etch chemistry is applied at a power of about 500 to about 1000 Watts.
- [c4] The method of claim 1, wherein said etching is implemented at a pressure of about 10 to about 150 mTorr.
- [c5] The method of claim 1, wherein said hardmask layer is formed at a thickness so as to accommodate a 1:1 etch selectivity with respect to said buried insulator layer and about a 5:1 to about a 35:1 etch selectivity with respect to said SOI layer and said bulk silicon layer.
- [c6] The method of claim 5, wherein said hardmask layer fur-

ther comprises:

a pad nitride layer formed on said SOI layer; and
a borosilicate glass (BSG) oxide layer formed on said pad nitride layer.

- [c7] The method of claim 6, wherein said hardmask layer is formed at a thickness of about 6,000 Angstroms to about 20,000 Angstroms.
- [c8] The method of claim 6, wherein said hardmask layer is formed at a thickness of about 10,000 Angstroms to about 18,000 Angstroms.
- [c9] The method of claim 5, wherein said buried insulator layer comprises a buried oxide (BOX) layer formed at a thickness of about 120 to about 140 nanometers.
- [c10] A method for forming a deep trench within a silicon on insulator (SOI) substrate, the method comprising:
forming a hardmask layer on an SOI layer of the SOI substrate;
patterning a desired deep trench pattern in said hardmask layer; and
etching through said SOI layer, a buried oxide (BOX) layer underneath said SOI layer, and a bulk silicon layer beneath said BOX layer using a single etch step.
- [c11] The method of claim 10, wherein said etching is imple-

mented with an HBR, NF_3 and O_2 etch chemistry.

- [c12] The method of claim 11, wherein said etch chemistry is applied at a power of about 500 to about 1000 Watts.
- [c13] The method of claim 10, wherein said etching is implemented at a pressure of about 10 to about 150 mTorr.
- [c14] The method of claim 10, wherein said hardmask layer is formed at a thickness so as to accommodate a 1:1 etch selectivity with respect to said BOX layer and about a 5:1 to about a 35:1 etch selectivity with respect to said SOI layer and said bulk silicon layer.
- [c15] The method of claim 14, wherein said hardmask layer further comprises:
 - a pad nitride layer formed on said SOI layer; and
 - a borosilicate glass (BSG) oxide layer formed on said pad nitride layer.
- [c16] The method of claim 15, wherein said hardmask layer is formed at a thickness of about 6,000 Angstroms to about 20,000 Angstroms.
- [c17] The method of claim 15, wherein said hardmask layer is formed at a thickness of about 10,000 Angstroms to about 18,000 Angstroms.
- [c18] The method of claim 13, wherein said buried insulator

layer comprises a buried oxide (BOX) layer formed at a thickness of about 120 to about 140 nanometers.